CH. 8- PROPORTIONS

$$\hat{p} = \frac{X}{n}$$

One proportion Z test:

Hypotheses: Ho: $p = \#$

Ha: $p > \#$

$<$

$\neq$

Test Statistic:

$$Z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}}$$

P-value: P(Z $\gtrless$ test statistic) = normalcdf(LB, UB, 0, 1)

Conclusion: usual 2 sentences

Confidence interval:

$$\hat{p} \pm Z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}} = (a, b)$$

Interpretation: We are ___% confident that the true proportion (or %) of _____ is between _____ and _____. (no units)

Assumptions:

1) SRS
2) np
   n(1-p) > 10

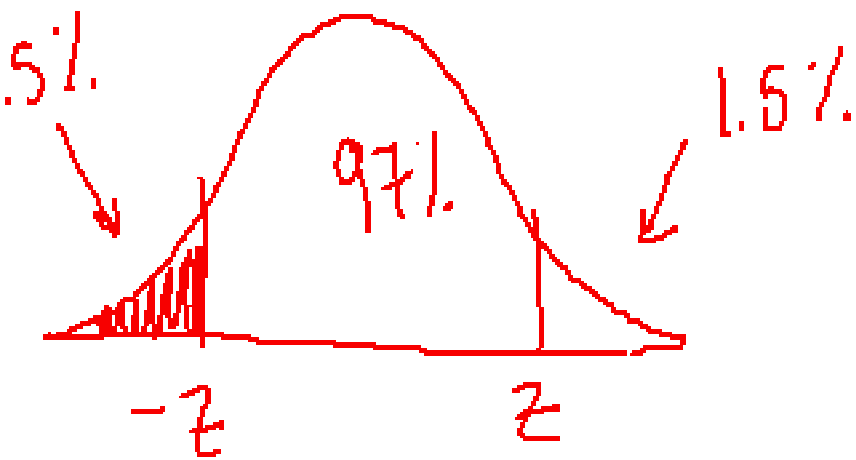
3) population > 10*n

Calculator:

1-prop Z test — Asks for X and N

1-prop Z int — p_o = from Ho

Choosing Sample Size:



margin of error:

$$m = Z^* \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$-z = \text{invnorm}(0.015, 0, 1)$

Fill in: m, Z^*, $\hat{p}$

Solve for _n_ and ALWAYS _round up_.

What do we use for $\hat{p}$?

- guess from the problem (or previously known value given in problem)

- If no guess, use 0.50

Rearranged Formula:

$$n = \left(\frac{Z^*}{m}\right)^2 (\hat{p})(1-\hat{p})$$

2 proportion Z test

The test statistic is always pooled but the confidence interval is always unpooled.

$$\hat{p} = \frac{X_1 + X_2}{n_1 + n_2} \neq \hat{p}_1 + \hat{p}_2$$

Hypotheses: Ho: $p_1 = p_2$

Ha: $p_1 > p_2$ ($<$, $\neq$)

Test Statistic:

$$Z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

pooled

P-value: P(Z $\geq$ / $\leq$ test statistic) = normalcdf(LB, UB, 0, 1)

Conclusion: - reject/ fail to reject Ho...

- We have sufficient evidence that the percent of ____ is ____ ($=$, $>$, $<$, $\neq$) the percent of ___ .

Confidence interval:

$$(\hat{p}_1 - \hat{p}_2) \pm Z^* \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}} = (a, b)$$

Interpretation: We are ___% confident that the difference between the proportion (or %) of _____ and _____ is between _____ and _____. (no units)

Assumptions:

1) 2 independent SRS

2) $n_1(\hat{p}_1)$, $n_1(1-\hat{p}_1)$, $n_2(\hat{p}_2)$, $n_2(1-\hat{p}_2)$ > 10

3) population 1 > $10*n_1$
population 2 > $10*n_2$

Calculator:

2-prop Z test
2-prop Z int

Asks for X1 and N1 and X2 and N2

#5 on worksheet

$$0.02 = z^* \sqrt{\frac{(0.17)(0.83)}{1703}}$$

$$z^* = 2.1972$$

normalcdf(

97.2%